REMARKS

Claims 1-20, as amended, and new claims 21-23 appear in this application for the Examiner's review and consideration.

Claims 1, 2-4, 6-9, 11-13, 15, and 18 have been amended without change of scope to more particularly point out the present invention. Support for amended terms can be found in the specification at, e.g., ¶¶ 52 and 63 (in U.S. publication 2005/0066886 A1). Claim 14 has been amended to independent form by combining with claim 1; claim 17 has been amended to independent form by combining with claims 1 and 14. New claims 21-23 are supported in the specification at, e.g., ¶¶ 65 and 70-75 and Figs. 10 and 13. As these amendments do not introduce any new matter, their entry is requested.

Claims 1-20 have been rejected under 35 U.S.C. § 102(b) and under 35 U.S.C. § 103(a) as being anticipated by or unpatentable over Huang et al., 2001, App. Phys. Lett. 78:1267 ("Huang"). The rejections are traversed because Huang does not disclose or suggest all the limitations of any pending claim.

This invention is directed to methods for producing one or more multilayer wafers with surface layers of high crystal quality and high thermodynamic stability. The claimed invention is most easily explained and the differences from Huang most easily pointed out by relating the claims to the preferred embodiments illustrated in Figs. 1-15. Accordingly, the independent claims are presented as amended with parenthetical reference numbers identifying structures in the figures that correspond to the associated claim terms.[1]

Independent claim 1 recites a process for which the preferred embodiment is illustrated by Figs. 3 through 7.

> 1. A method of producing a substrate for conducting epitaxial growth thereon, which comprises:
>
> obtaining a substantially relaxed epitaxial base layer (5) on an auxiliary substrate (7);
>
> transferring at least a portion (52) of the substantially-relaxed epitaxial base layer onto a carrier substrate (10) to provide a base substrate (17); and

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[1] Providing claims with reference numbers in this manner is solely for ease and clarity of explanation and without any limitation of the scope of the claim to the preferred embodiments illustrated. It should be understood that claims are to be interpreted to cover equivalents and modifications of the illustrated embodiments. See the specification at, e.g., ¶ 78.

> increasing the thickness of the transferred epitaxial base layer (52) transferred to the carrier substrate by epitaxial growth to form a further-grown epitaxial base layer (520) thereon while maintaining a high degree of thermodynamic and crystallographic stability of the further-grown epitaxial base layer.

The preferred initial structure provided to the processes of claim 1 is illustrated in Fig. 3 and described in the specification at, e.g., ¶¶ 52-53. This structure includes graded buffer layer (3) on substrate (1). The preferred final structure resulting from the processes of claim 1 is illustrated in Fig. 7 and described in the specification at, e.g., ¶¶ 63-65.

The further-grown epitaxial base layer (520) is an extension of the portion of the substantially-relaxed epitaxial base layer (52) that has been transferred to the carrier substrate (10), and both of these epitaxial layers have substantially the same composition. Both epitaxial base layers, in the embodiment of dependent claims 10 and 21, are SiGe. Further dependent claim 11, described in the specification at, e.g., ¶ 66, recites transferring portions of the further-grown epitaxial base layer (520) to one or more additional substrates.

Independent claim 14 recites a further preferred embodiment in which a second epitaxial layer is grown on the structure resulting from claim 1.

> 14. (all of claim 1 and)
>
> growing at least one second epitaxial layer (11) on the further grown portion that is associated with the carrier substrate.

This claim is illustrated in Fig. 8 and described in the specification at, e.g., ¶¶ 67.

Independent claim 17 recites a further preferred embodiment with a further epitaxial layer (521) grown in the structure resulting from claim 14.

> 17. (all of claim1 and)
>
> growing at least one second epitaxial layer (11) on the further grown portion that is associated with the carrier substrate, and
>
> growing an additional epitaxial base layer (521) of the same material as the transferred epitaxial (52) base layer on the second epitaxial layer (11)

This claim is illustrated in Fig. 9 and described in the specification at, e.g., ¶¶ 68-69.

The process of claim independent 17 is continued by splitting the wafer of Fig. 9 either in the second epitaxial layer (11), as illustrated in Fig. 13 and described in the specification at, e.g., ¶¶ 70-72, or in the further-grown epitaxial base layer (520), as illustrated in Fig. 10 and

described in the specification at, e.g., ¶¶ 74-75. The split portions are transferred to other substrates. These further processes are recited in independent claims 22 and 23, respectively.

Turning now to the Huang reference, it is respectfully submitted that this reference does not disclose or suggest all the steps of any of the independent or dependent claims. Huang discloses a process for producing a substrate that is illustrated in Fig. 1 on page 1266. It involves only (i) growing a relaxed SiGe layer on a Si substrate, (ii) transferring a top portion of the relaxed SiGe layer onto a handle wafer, and then (iii) growing a strained Si layer on the transferred SiGe layer. <u>No further process steps are disclosed or suggested by Huang</u>.

First, Huang does not disclose or suggest "obtaining a substantially relaxed epitaxial base layer on an auxiliary substrate" by growing such a layer on a graded buffer layer. Comparison of Fig. 1 with Fig. 2 illustrates how the "substantially relaxed epitaxial base layer" (5) is provided on buffer layer (4). In the case of a auxiliary substrate of Si and a "substantially relaxed epitaxial base layer" of SiGe, the graded buffer layer has a gradually increasing concentration of Ge from base to surface. As is apparent from the first step in Fig. 1 of Huang and from the top partial paragraph on the left column of p. 1267, Huang discloses growing a SiGe layer directly on a Si substrate. As a result Huang's SiGe layer has a network of misfit dislocations at the Si-SiGe interface. In contrast to Huang's process, the claimed process has the advantage that the "substantially relaxed epitaxial base layer" on the graded buffer layer is of high enough quality that portions can be transferred to other substrates. See the specification at, e.g., ¶ 52.

Next, Huang does not disclose or suggest "increasing the thickness of the transferred epitaxial base layer . . . by epitaxial growth to form a further-grown epitaxial base layer". Comparison of Fig. 6 with Fig. 7 illustrates that that the "further-grown epitaxial base layer" 520 is "further-grown" on "substantially relaxed epitaxial base layer" 52. This "further-grown epitaxial base layer" and the "substantially relaxed epitaxial base layer" are of the same of similar materials. See the specification at, e.g., ¶ 65. Fig. 1 of Huang does not illustrate any such "further-growth" of layer of substantially the same composition. Instead, Huang only discloses growing a strained Si layer directly on a SiGe layer. Again in contrast to Huang, the claimed "further-grown epitaxial base layer" has the advantage that it is also of high enough quality that further portions can be transferred to other substrates. See the specification at, e.g., ¶ 63-65.

Finally, Huang's process terminates after growth of the strained Si layer; there are not further steps. In particular, there is no disclosure or suggestion of the following aspects: growth a second epitaxial base layer (11) on the "substantially relaxed epitaxial base layer" (520) as is illustrated in Fig. 8; or continued growth of a further epitaxial base layer (521) on the second epitaxial base layer (11) as is illustrated in Fig. 9; or splitting a substrate the "substantially relaxed epitaxial base layer" (520), the second epitaxial base layer (11), and the further epitaxial base layer (521) as is illustrated in Figs. 9, 10, and 13.

In summary, Huang does not disclose or suggest all the elements of any independent or dependent claim for the following reasons. The elements "obtaining a substantially relaxed epitaxial base layer" or "a further-grown epitaxial base layer" are recited in all independent and dependent claims, claims 1, 14, and 17, but are not disclosed or suggested by the Huang reference. Next, the element "transferring a portion of the further-grown epitaxial base layer from" is recited in dependent claim 11, but is also not disclosed or suggested by the Huang reference.

Next, the element "growing at least one second epitaxial layer on the further grown" epitaxial base layer is recited in independent claims 14 and 17 and their dependent claims, but is also not disclosed or suggested by the Huang reference. Next, the element "growing an additional epitaxial base layer of the same material as the transferred epitaxial base layer on the second epitaxial layer" is recited in independent claim 17 and its dependent claims, but is also not disclosed or suggested by the Huang reference. Finally, the element of splitting and transferring the structure of claim 17 is recited in dependent claims 22 and 23; this also is not disclosed in the Huang reference.

Therefore, it is respectfully submitted that the current rejections are not correctly based on the Huang reference, and therefore they should be withdrawn.

CONCLUSION

In view of the above amendments and remarks, the applicants respectfully submit that the entire application is now in condition for allowance, early notice of which would be appreciated. Should the Examiner not agree that all pending claims are allowable, then a personal or

telephonic interview is respectfully requested to discuss any remaining issues and expedite the eventual allowance of these claims.

Respectfully submitted,

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